The text of this document is to be inserted in place of the current text in section 4.7 "Fuel Tank" of NIST Handbook 105-8, Draft 3

4.7 Fuel Tank *

4.7.1 Capacity and shape

Liquid fueled weight carts shall have a maximum fuel capacity of 231 cubic inches (3785 cm^3). The fuel tank shall have the general shape of a right circular cylinder and shall comply with all applicable state and federal regulations. The top of the fuel tank, when mounted to the weight cart, shall not extend above the plane described by the top edge of the weight restraint system. A representative fuel tank design is shown in Attachment 1; variations of this design are permitted. Prior to production, manufacturers should obtain the approval of the NIST Office of Weights and Measures for new fuel tank designs. New designs should be submitted to the Office of Weights and Measures, National Institute of Standards and Technology, Gaithersburg, MD 20899.

4.7.2 Cross Sectional Area of Tank

The combined cross sectional area of the fuel tank and sight gauge must be no greater than 12.5 square inches (81 cm^2) at all liquid levels within the graduated range.

4.7.3 Fuel Tank Material

The fuel tank shall be constructed of low carbon steel or corrosion resistant stainless steel. Non-integral hardware may be constructed of other materials provided the material is durable and suitable for its intended purpose.

4.7.4 Fuel Tank Color and Finish

The fuel tank shall be light in color to minimize heating of the fuel by radiant heat sources. Any plating or paint materials shall not be degraded by contact with the fuel. A natural stainless steel color is acceptable.

4.7.5 Fuel Tank Drain

If equipped with a fuel tank drain apparatus, the drain assembly must extend past the edge of any nearby weight cart structure.

4.7.6 Gauge Assembly

4.7.6.1 Gauge Tube

4.7.6.1.1 Material

Weight cart fuel tanks shall be equipped with a (liquid-level) gauge tube mounted on the side of the tank body in plain view of the weight cart operator. The gauge tube shall be made of borosilicate glass, be clear and free of any markings, irregularities or defects which will distort the appearance of the liquid surface. The gauge tube may be coated to prevent fuel spillage in case of tube breakage, provided the coating material is clear and free of markings, irregularities or defects that will distort the appearance of the liquid surface and is not degraded by contact with the fuel.

4.7.6.1.2 Mounting

The gauge tube shall be mounted in fittings which penetrate the tank body near the base (as flush as possible to minimize air entrapment) and which penetrate the tank body as near the top as possible (to allow passage of vapors from the tube for vapor recovery purposes). The fitting at the top of the tube may have a removable plug so the tube can be cleaned. The plug shall not interfere with proper vapor equalization (i.e., no pressure build up that affects the liquid level in the gauge). Removal and replacement of the tube shall be made possible and leak proof by the use of compressible gaskets or "O" rings.

4.7.6.2 Shield

On fuel tanks where protection of the tube is provided by a shield or cover, the design of the cover shall allow replacement of the gauge tube without difficulty.

4.7.6.3 Scale Plate and Graduations

4.7.6.3.3 Material

The scale plate shall be rigid, and resistant to corrosion and discoloration (anodized aluminum or stainless steel.

4.7.6.3.4 Location

The scale plate shall be mounted on a secant to the front of, or slightly in front of the gauge tube. In no case shall the scale plate be more than 6 mm (0.25 in) from the tube.

4.7.6.3.5 Mounting

There shall be a sufficient number of scale brackets (minimum of two) to hold the scale plate rigidly in place. The scale plate shall be securely attached to the brackets and be provided with a means for sealing.

4.7.6.3.6 Scale units

The basic units on all fuel tank scales shall be cubic inches on the left side of the gauge tube and ½ pounds of fuel, based on the average density of the fuel used at the API standard temperature of 15 °C, on the right side. Each scale shall be clearly marked as to the applicable unit of measure. Scale plates will be of one piece construction and adjusted and sealed as a unit.

4.7.6.3.7 Graduation spacing

The minimum distance between any adjacent graduations lines shall be 2 mm (0.0625 in), and the lines shall be evenly spaced.

4.7.6.3.8 Span of graduations

The sight gauge scale shall be graduated at a reference (0) line and at ½ pound and 10 cubic inch increments below the reference line. The reference line shall be approximately 1 inch from the top of the gauge tube. The distance between the markings shall be established based on the fuel tank cross-sectional area and the API table value for the recommended fuel.

4.7.6.3.9 Scale lines

The graduation lines, numbers, and other inscriptions on the scale plate shall be engraved or etched, permanent, and of a contrasting color to that of the plate.

4.7.6.3.10 Line spacing and width
Major division lines, consistent with the measurement system used, shall be longer than subdivision lines and be numbered. The length of the major (numbered) graduation lines on scale plate shall be no less than 6 mm (0.25 in), and the intermediate lines shall be no less than 3 mm (0.125 in) in length. All lines shall extend to the edge of the scale plate nearest the gauge tube. Graduation lines shall be of uniform width and not more than 0.6 mm (0.025 in) or less than 0.4 mm (0.015 in) wide. Intermediate graduation lines are not required.

4.7.6.3.11 Nominal and zero marking
The reference volume and zero lines on all scale plates shall extend across the entire width of the scale plate and shall be clearly identified.

4.7.6.3.12 Additional markings
Scale plates shall be clearly marked with the type of fuel and fuel density for which it is intended. Letters and numbers shall be legible and of adequate size, in no event smaller in height than 5 mm (0.2 in).

4.7.7 Tolerances (Maximum Permissible Error)
The difference between the actual volume and the indicated volume at the prescribed reference temperature (15 °C) shall not be greater than ± 2 cubic inches (32.8 cm^3).

4.7.8 Fuel Tank Initial and Periodic Verification
Weight cart fuel tank scale plate graduations must undergo initial verification for conformance to these specification and tolerances during the initial calibration of the weight cart, prior to placing the weight cart into service, and when damage is suspected. Routine calibration of the fuel tanks is not recommended.

4.7.9 Fuel Tank Verification Method
Verification to determine whether weight cart fuel tanks meet applicable tolerances is performed by calibration using accepted volume transfer calibration procedures. The uncertainty of the test method must be less than one-third of the tolerance.

4.8 Fuel Level Error Weights
The manufacturer of a liquid fueled weight cart shall supply fourteen one-half pound error weights in a box that is separate from the weight cart. A means shall be provided (e.g., a basket or hook arrangement) whereby the operator can easily and securely attach the one-half pound error weights to the weight cart structure to compensate for weight lost as liquid fuel is expended. The mounting arrangement shall securely restrain the Fuel Level Error Weights to prevent them from vibrating. The error weights shall be placed on the weight cart structure only when required to compensate for expended fuel. The Fuel Level Error Weights shall conform to tolerances and specifications contained in

NIST Handbook 105-1, Specifications and Tolerances for Field Standard Weights (NIST Class F).